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(12) UK Patent Application (19) GB (11) 2 182 087 (13) A

(43) Application published 7 May 1987

(21) Application No 8624863

(22) Date of filing 16 Oct 1986

(30) Priority data

(31) 8526300

(32) 24 Oct 1985

(33) GB

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(51) INT CL⁴

E06C 7/42 7/46 7/48

(52) Domestic classification (Edition I):

E1S LR

(56) Documents cited

None

(58) Field of search

E1S

Selected US specifications from IPC sub-class E06C

(54) Ladder conversion kits for roof-scaling

(57) Pairs of frictional grip-boards A whose undersides carry soft plastics foam or the like are equipped with means for temporary fixing to one face of a ladder-section, near to its respective ends, enabling the ladder to adhere to sloping tiled surfaces and thus be employed for roof-scaling or as a safe structure on which to stand while working upon roofs. Two elaborations are described, one involving use of a small wheel B at the edge of each grip-board, the other employing circular rotatable grip-boards F, each version permitting the associated ladder to be rolled up a roof when tipped onto its edge. A ridge-hook attachment is included for use when it is necessary to reach the apex of extra-steep or slippery roofs, and modifications of this attachment are proposed as an aid to associated ladder operations.

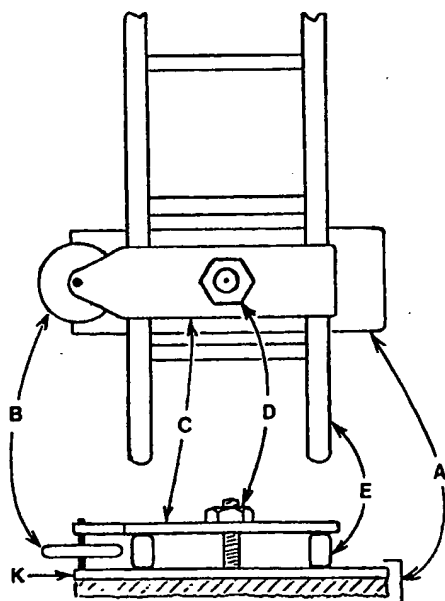


FIG 2

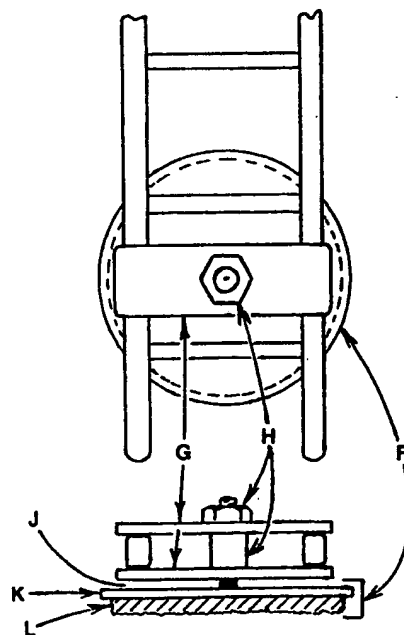
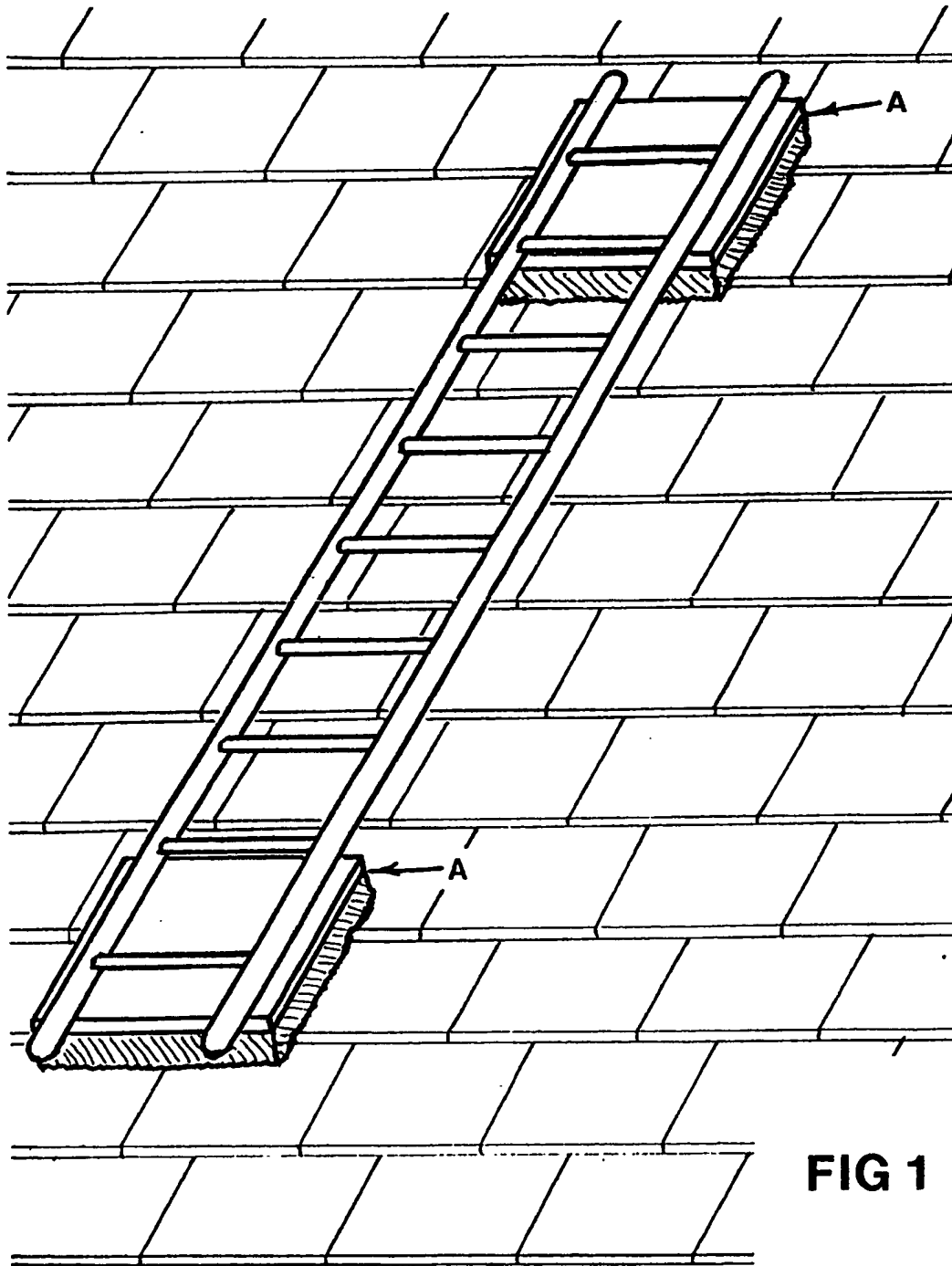
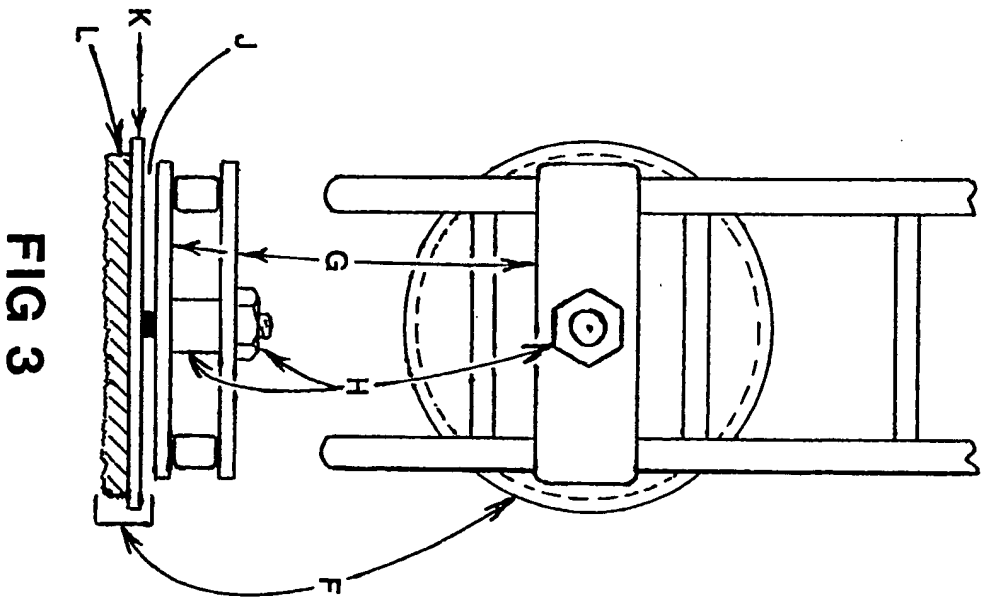
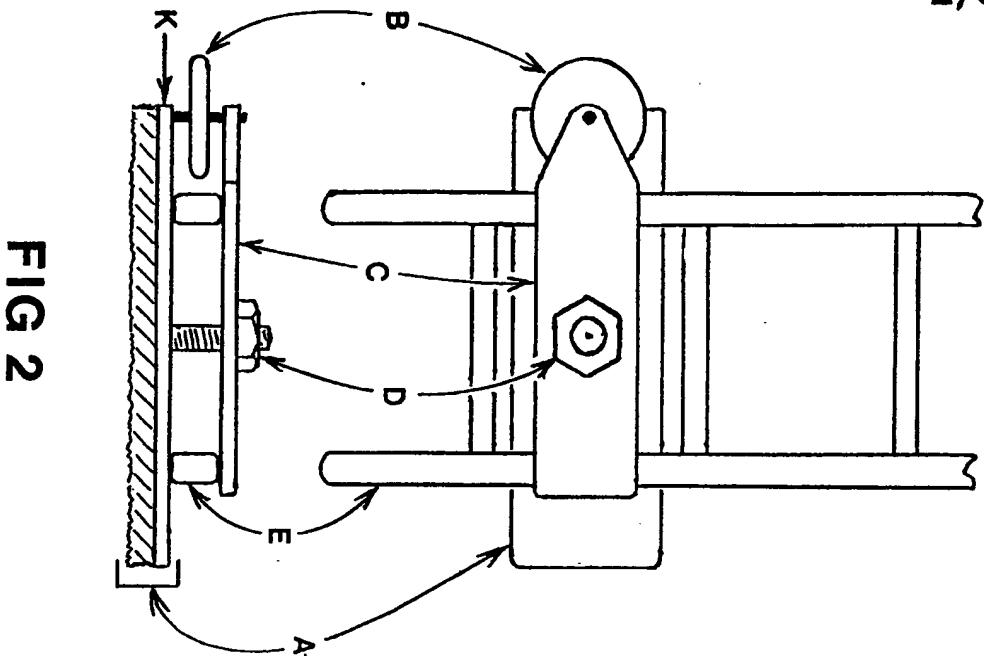


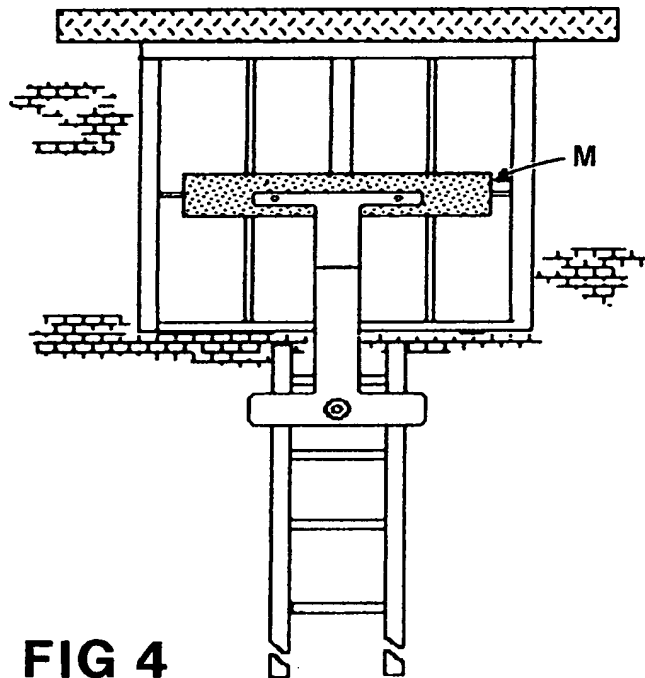
FIG 3

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SPECIFICATION

Ladder conversion kits for roof-scaling

5 I, Henry John Frederick Crabbe of 303 Whitehorse Lane, South Norwood, London SE25 6UG, a British subject, do hereby declare the invention for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

10 This invention concerns accessories which may be attached to conventional ladders to provide a firm frictional grip when such ladders are laid upon sloping surfaces, thus facilitating their easy conversion for roof-scaling operations, or their use as safe working bases when performing decorating and other tasks which require stable access from a tiled roof.

15 The accessories described exploit the properties of frictional grip-boards comprising rigid or semi-rigid flat members whose undersides carry a depth of soft urethane foam—or other foam plastics, foam rubbers, or materials with similar mechanical properties. Such grip-boards exhibit frictional behaviour as per data cited in Patent Application GB 2131 475 A, while their use here comprises elaborations of the ladder stabilizing devices specified in Claim 7 of Patent Application GB 2160 570 A, such that it becomes possible to roll a ladder-section into position up a roof before engaging it frictionally with the tiles.

20 If two of the above grip-boards are attached to one face of a typical ladder-section near its ends, as at A in Fig. 1, they will provide sufficient grip for the ladder to remain stationary on tiled roofs of considerable slope (up to a maximum of 56° on standard concrete tiles), thus permitting an operator to climb up a roof or to use the ladder as a working base thereon. A ladder so equipped will be held clear of the roof's surface by the grip-boards, thus providing easy footholds on its rungs, while the grip-boards themselves ensure that the combined weight of the ladder and its user(s) is distributed via a compliant material over sufficient area to avoid risk of tile fracture. Such a ladder may be placed in any position up or across a roof, as circumstances dictate, to provide every option from use for simple roof-scaling to transverse placement as a working 'platform'.

25 The grip-boards' rigid upper surfaces may be secured to the ladder's underside by clamps, clips, spring-hooks, elasticated cords, fixing-bolts, or any other convenient but safe means of engaging with the ladder's stiles and/or rungs. Also, assuming use of at least the minimum area of foam needed for adequate frictional support (approximately 1000 sq.cm per grip-board), the boards may be of various shapes—as long as they extend beyond the ladder's two stiles to provide lateral stability.

30 However, the present invention proposes two

particular refinements of grip-board construction as its main embodiment: namely, either the addition of a small wheel to one side of each board in order to provide the above-mentioned rolling facility, or the use of circular boards which also serve as wheels to achieve the same effect. In either case, by tipping the ladder onto its edge it becomes possible to manoeuvre it into position on a roof by simple rolling action, before laying it flat for frictional support by means of the grip-boards.

35 Fig. 2 shows a rectangular grip-board A clamped near to the end of a ladder, with a small wheel B accommodated at one side and free to revolve on a spindle. In this case, the wheel's axle runs between the grip-board's rigid upper member K and the fixing clamp C, but any convenient mounting arrangement could be used. Likewise, in the illustration a simple stub-bolt and nut D provide a clamping force onto the ladder's stiles E, but any suitably secure mode of fixing may be adopted, whether to stiles or rungs. But whatever the construction, axle arrangements for wheel B must facilitate the assembly's use on ladders of various widths and stile thicknesses, while incorporating some means of stabilizing the wheel axially—ideally to keep its plane of rotation within the ladder's overall thickness. In a more elaborate version, the grip-board assembly could have a wheel on each side, so that the ladder could be rolled along on either of its edges.

40 Figure 3 shows the corresponding arrangement using a circular grip-board (or 'wheel-board') F. Here, the fixing method must leave the wheel-board free to rotate on its axis when not loaded by compression between the ladder's underside and a roof. In the illustration it is assumed that a pair of clamping members G will grip both sides of the ladder's stiles (or rungs), while a combined fixing-bolt and bearing assembly H provides a rotational facility for wheel-board F. The latter is set away from the fixing system's underside by a suitable clearance J, but when under load it should be arranged that a compliance within the bearing system closes this gap so as to couple the grip-board to the ladder via the clamping member's full width.

45 Again, the precise method of attaching the complete system to a ladder is unimportant, provided it is secure and includes a stable axial bearing for the wheel-board. The latter should feature a suitably tough material or tyre around the periphery of its rigid member K (as should wheel B in Fig. 2), while the foam pad L should be of a slightly smaller diameter than board K to avoid fouling on tiles, etc, when the ladder is being manoeuvred into position.

50 As a safety precaution when working on extra-steep roofs or on slate tiles, the clamping or fixing mechanism of whichever grip-board is attached to the ladder's upper end could usefully carry a ridge-hook extension for

engagement with the roof's apex. Such an attachment might also be adaptable for use as a stand-off device when the ladder is not being employed for roof-climbing operations, or

5 when one or two sections of a ladder are used to gain access to a roof while a third (fitted with wheeled grip-boards) is placed on the tiles for roof-scaling. An adjustable stand-off could then engage with the lower edge of
10 a roof to hold its associated ladder clear of guttering, etc, so that the user had easy access for placing the roof-scaling ladder-section in position. Such an adjustable device, possibly based on Patent Application GB 2160
15 570A (Claim 2) might also lend itself to the addition of variously shaped grip-boards for resting on windows or other delicate structures as shown in Fig. 4, where the area of soft foam beneath grip-board M would distribute the load harmlessly.

20 Any such adjuncts to the central invention could form parts of a conversion kit designed to extend the functions of existing ladders. The basic kit would comprise two wheeled
25 grip-boards (or wheel-boards) and a ridge-hook, this being the minimum safe combination for roof-scaling activities. The grip-board assemblies could be of the same general type as those shown in Figs. 2 or 3, although any
30 convenient method of providing wheel rotation could be employed, as also any suitable means for easy but safe fixing near to the ends of a ladder. The materials employed for non-foam parts of the grip-board assemblies
35 could be metal, plastics, glass-fibre, wood, or wood-composite, while dimensions would be chosen to provide a total grip-board area sufficient to support a stated size of ladder and number of operatives on roofs of specified
40 maximum pitch for various types of tile surface.

A kit might offer any combination of the various devices described in this Specification, and in particular could be extended by provision of further pairs of wheeled grip-boards
45 or wheel-boards for use on additional ladder-sections, plus hooks or brackets for coupling the latter end-to-end up a long run of roofing. Also, various elaborations of the ridge-hook assembly could facilitate its adaptation to the
50 stand-off roles mentioned earlier, while a cheap version of the kit could abandon the 'wheel' facility and offer just a pair of simple clip-on grip-boards to convert ladders for use
55 on low-level porch roofs, etc

In all cases, the possibility of eventual wear or damage to the grip-boards' soft foam undersides could be anticipated by arranging that the latter are attached to the associated rigid
60 upper members by means of some suitable peel-off artefact, with replacement foams readily available.

CLAIMS

65 1. Grip-boards comprising rigid or semi-rigid flat members whose undersides carry a

depth of soft urethane foam having a high coefficient of friction on mineral surfaces (or other foam plastics, foam rubbers, or materials with similar mechanical properties), such
70 grip-boards being elaborated with a wheeling facility as in Claims 2-4 below, and used in pairs designed and equipped for fixing temporarily but firmly to the stiles and/or rungs of a
75 ladder-section, on one face of the ladder and near to its two ends so that when this face is laid downwards on a sloping tiled roof, the ladder adheres and may thus be used for roof-scaling purposes or to provide a stable
80 base on which an operative may stand while working.

2. Grip-boards as claimed in Claim 1, but each equipped with a suitably tyred small wheel at one edge, the wheel's axis of rotation being set at rightangles to the plane of
85 the grip-board, with its outer edge protruding beyond the board's extremity such that when the ladder to which the grip-board is attached is fitted with two such assemblies and tipped
90 onto its edge, the wheels take its weight so that it can be rolled up or across a sloping roof for positioning as required.

3. Grip-boards as claimed in Claim 2, but fitted with wheels on both sides.

4. Grip-boards as claimed in Claim 1, but of circular shape and equipped with a rotary bearing and a suitably tyred periphery, such that when the associated ladder is tipped
95 edgewise the 'wheel-boards' are free to rotate and thus facilitate a rolling action as in Claim 2, while when used to sustain the ladder under load on a roof, the wheel-boards' rotary mechanisms allow them to adopt a fully supportive role across their widths.

5. Detachable peel-off foams on any of the grip-boards described in Claims 1-4, with suitable replacement foams available to cope with damage or wear.

6. A ridge-hook attachment for use in conjunction with whichever grip-board is fitted at
110 the ladder's upper end, designed to integrate with the grip-board's own ladder-clamping or fixing mechanism and to be employed as a safety precaution in situations where it is
115 necessary to reach the apex of a roof having an exceptionally steep slope and/or smooth tiles.

7. An adaptation of the ridge-hook attachment in Claim 6, such that a ladder may be provided with stand-off facilities—perhaps
120 with a range of variously shaped grip-boards to provide safe support on windows, roof edges, etc.

8. A kit of accessories for ladder conversion, comprising any combination and quantity of the devices described in Claims 1-7, with an option to include some means of linking
125 two or more ladder-sections end-to-end on a roof.

9. Ladder accessories and conversion kits

substantially as described herein, with reference to Figs. 1-4 of the accompanying drawings.

Printed for Her Majesty's Stationery Office
by Burgess & Son (Abingdon) Ltd, Dd 6991685, 1987.
Published at The Patent Office, 25 Southampton Buildings,
London, WC2A 1AY, from which copies may be obtained.